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AMENDMENT UNDER PCT ARTICLE 34

With respect to International Application No. PCT/JP2004/010618, filed on July 26, 2004, the applicant canceled sheets 6, 20, 21 of the Description entirely and submitted substitute sheets 6-1, 6-2, 20-1, 20-2, 21-1, 21-2 of the Description which are attached hereto. Explanation of some related art documents is added and the associations between the Description and claims 5 and 7 are clarified.

Engineers Technical Research Report MI2000-75, 2001, pp.145-149

- Tsunashima H, Befu S, Arai Y: "Stereoscopic Image Construction Method" (Japanese Patent Application No. 2000-358420), 2000

- Befu S, Tsunashima H, Arai Y: "A Study in 3-Dimensional Image Processing Method for 3 DX Multi Image Micro CT", CARS2001, 2001, pp.665-670

- Tsunashima H, Befu S, Yamada A, Arai Y: "3-Dimensional Image Construction Method In Small X-ray Calculated Tomography for Dental Use", Med. Imag. Tech. 21:157-165, 2003.

There is known a method for carrying out post-correction processing by choosing automatically a matrix filter which is suited for the image when applying a matrix filter as post-correction processing to the reconstructed image data in a medical image processing device. See Japanese Laid-Open Patent Application No. 07-000385.

Japanese Laid-Open Patent Application No. 09-204518 discloses a method for calculating the accumulated average of 4 neighboring pixels (up/down/right/left), or the accumulated average of 8 neighboring pixels including diagonal pixels, of the target point in the same image with respect to parallel slice data. Also disclosed is a method for calculating the accumulated average of 6 neighboring pixels of a solid body in which 4 neighboring pixels in the same image and the pixels of the same positions in the adjacent image are added, or the accumulated average of 26 neighboring pixels of a solid body in which 8 neighboring pixels in the same image and 3x3 pixels in the adjacent image are added.

However, the method of this document is related to the slice data correction processing, and there is no teaching in this document of calculating the integrated value of consecutive voxels in a 3-dimensional CT data without changing the 3-dimensional CT data for the correction as in the present invention.

Japanese Laid-Open Patent Application No. 2002-374418 discloses a method for performing the processing corresponding to the pixel value, and performing the noise reduction processing and the sharp image processing by a single processing system.

However, the method of this document is related to the smoothing processing in which the low frequency components and the high frequency components are taken into account, and there is no teaching in this document of calculating the integrated value of consecutive voxels in a 3-dimensional CT data without changing the 3-dimensional CT data for the correction as in the present invention.

DISCLOSURE OF THE INVENTION

However, the method disclosed in Japanese Laid-Open Patent Application No. 07-000385 requires preparation of a matrix filter suited for the image in advance. Therefore, in a case of a special image, there is a problem that it is necessary to separately create and prepare a matrix filter suited for the special image.

As for the methods in the above-mentioned documents, it is turned out as a result of examining the reconstructed 3-dimensional image that the image is expanded toward a peripheral direction from the center of rotation of extraction and the size of the object of the reconstructed image is inaccurate.

calculated after rearrangement.

Although the average value of the pixel values of the 8 upper-rank sums is calculated in this embodiment, the present invention is not limited to this embodiment. For example, a sum of the pixel values of the 8 upper-rank sums may be calculated respectively so that a total of such sums may be calculated.

In this case, the currently observed is set as a starting point, and an integrated value of a predetermined number of consecutive 3-dimensional CT data elements is calculated for each of a plurality of directions with the currently observed 3-dimensional CT data element being set as the starting point. And a sum of a predetermined number of upper-rank integrated values among respective integrated values calculated for the plurality of directions is calculated.

(4) When the average value for the eight directions is larger than a predetermined threshold value, it is determined that this pixel is the information on a part of the object, and the image is outputted.

This threshold value Thr_F is set up based on average value F_{AV} of the sums f[0] - f[25] and the maximum value F_{MAX} of the sums f[0] - f[25]. For example, the threshold value Thr_F is calculated in accordance with the following formula:

$$Thr_F = k2 \times (F_{MAX} - F_{AV}) \qquad \ldots (16)$$

where k2 is a constant value.

According to this method, the edge of the image becomes clear.

Alternatively, a difference between an average value of the pixel values of the 8 upper-rank sums and an average value of the pixel values of the 8 lower-rank sums may be calculated, and the pixel value of the

target point is corrected based on the difference, and when the corrected value is larger than a predetermined threshold value, the target point is determined as being a part of a boundary plane.

That is, the average value of the pixel values of the 8 upper-rank sums is set to F8max, the average value of the pixel values of the 8 lower-rank sums is set to F8min, and the value Voxel of the target point of the 3-dimensional CT data is corrected based on the difference

between F8max and F8min, and it is determined whether it is regarded as the information on a part of the object based on the correction value.

The average value may be calculated by dividing the sum of the pixel values for the 8 directions by 8. If the divisor is regarded as a fixed value, the sum of the pixel values for the 8 directions may be considered as the average value.

Specifically, an intensified correction value Voxel_e is calculated from the value Voxel of the target point of the 3-dimensional CT data in accordance with the following formula (17) using an intensifying coefficient k3 $(0<k3)$:

$$Voxel\_e = Voxel + k3\,(F8max - F8min) \quad (17).$$

It is determined whether it is regarded as the information on a part of the object, depending on whether the intensified correction value Voxel_e is larger than a predetermined threshold value.

In this case, a sum of a predetermined number of upper-rank integrated values among respective integrated values calculated for the plurality of directions and a sum of a predetermined number of low-rank integrated values among the respective integrated values calculated for the plurality of directions are calculated. The currently observed 3-dimensional CT data element is corrected based on the sum of the predetermined number of upper-rank integrated values and the sum of the predetermined number of low-rank integrated values. The corrected 3-dimensional CT data element is compared with the predetermined threshold value, and it is determined based on a result of the comparison whether the currently observed 3-dimensional CT data element is the data of a processing target.

In the above embodiment, the average values F8max and F8min are calculated. Alternatively, a sum of the pixel values of the 8 upper-rank sums and the pixel values of the 8 lower-rank sums may be calculated instead.

When the target point of the 3-dimensional CT data is exactly on the boundary of the surface, the F8max is large and the F8min is small, and the value of (F8max -F8min) is large. Therefore, based on the intensified correction value Voxel_e obtained by the formula (16), the determination as to whether it is on a boundary plane can be made adequately accurate.

This technique is the processing in which a characteristic point is extracted from the 9x9x9 areas centered on the target point with respect to the 4 voxels for all the directions. The load complexity of the